**Plant based particles for cell and vitamin encapsulation manufactured by membrane emulsification**

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 Poster

Improvement of health and sustainability are major challenges in today’s society and there is a drive to develop novel food products containing bioactive compounds to impart certain health benefits. However, the utilization of bioactive compounds in food products has certain limitations in terms of decomposition and low stability during food processing conditions, which reduces their bioavailability as well as functional properties. Therefore, this work focused on the development of plant-based microparticles suitable for sustainable delivery and building of functional food products1.

Pectin, a plant-derived polysaccharide, was used to create microcapsules using a bench-top Dispersion Cell (laboratory Membrane emulsification setup). Membrane emulsification (ME) is a gentle (low shear) drop generation technique where the dispersed phase drops, in this case of pectin, are injected into continuous oily phase with the surfactant. Drops are detached via stirring which allows controlled and uniform production of microparticles and the process is scalable2,3. This is advantageous over conventional emulsification techniques (e.g. microfluidizer, high shear mixer...) which suffer from poor size control and batch-to-batch variability and often due to high energy generation can impact the bioactive compounds. The continuous phase was comprised of rapeseed oil, with paraffin oil added as viscosity modifier, and the viscosity was between 34 and 57 mPa.s. Span 80 surfactant in the continuous phase stabilised the emulsion. A Design of Experiments approach was employed to optimise emulsion stability and test various operating parameters and formulations to achieve uniform pectin droplets.

Droplets ranging between 27 to 200 µm were produced. It was determined that the viscosities of the pectin (dispersed phase) and the immiscible oil (continuous phase) were important factors in determining droplet size and stability. Uniform droplets (≈ 30 % Coefficient of Variation) were produced with three different low-methylated pectins of varying degrees of amidation, molecular weight and branching, indicating that ME is a useful tool for uniform microcapsule production of structurally diverse pectins. With some further modifications to the formulation to ensure food safety, these pectin microcapsules are intended for encapsulation of sensitive functional food ingredients such as probiotics and vitamins.

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